

# ABSTRACT

A novel class of proton exchange membrane materials, sulfonated poly(phthalazinones), were prepared by modification of poly(phthalazinone). Sulfonation reactions were conducted at room temperature using mixtures of 95-98% concentrated sulfuric acid and 27-33% fuming sulfuric acid with different acid ratios in order to get SPPEK with degree of sulfonation (DS) in the range of 0.6 to 1.0. The presence of sulfonic acid groups was confirmed by FT-IR analysis, and the DS and structures were characterized by NMR. The introduction of sulfonic groups into the polymer chains led to an increase in the glass transition temperature and a decrease in the decomposition temperature. Membrane films were cast from solution in *N,N*-dimethylformamide or *N,N*-dimethylacetamide. Water uptakes and swelling ratios of the membrane films increased with DS and sulfonated polymers with DS > 1.2 were water soluble at 80°C. Proton conductivity increased with DS and temperature up to 95°C, reaching  $10^{-2}$  S/cm.